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JUNIOR LYCEUM ANNUAL EXAMINATIONS 2010

Directorate for Quality and Standards in Education
Educational Assessment Unit

BIOLOGY – FORM V
TIME: 1H 45 MIN

NAME: _____ CLASS: _____

Question No.	Section A							Section B					
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	
Max mark	7	8	9	8	5	9	9	15	15	15	15	15	
Actual mark													**TOTAL MARK**

85% Theory Paper	15% Practical	100% Final Score

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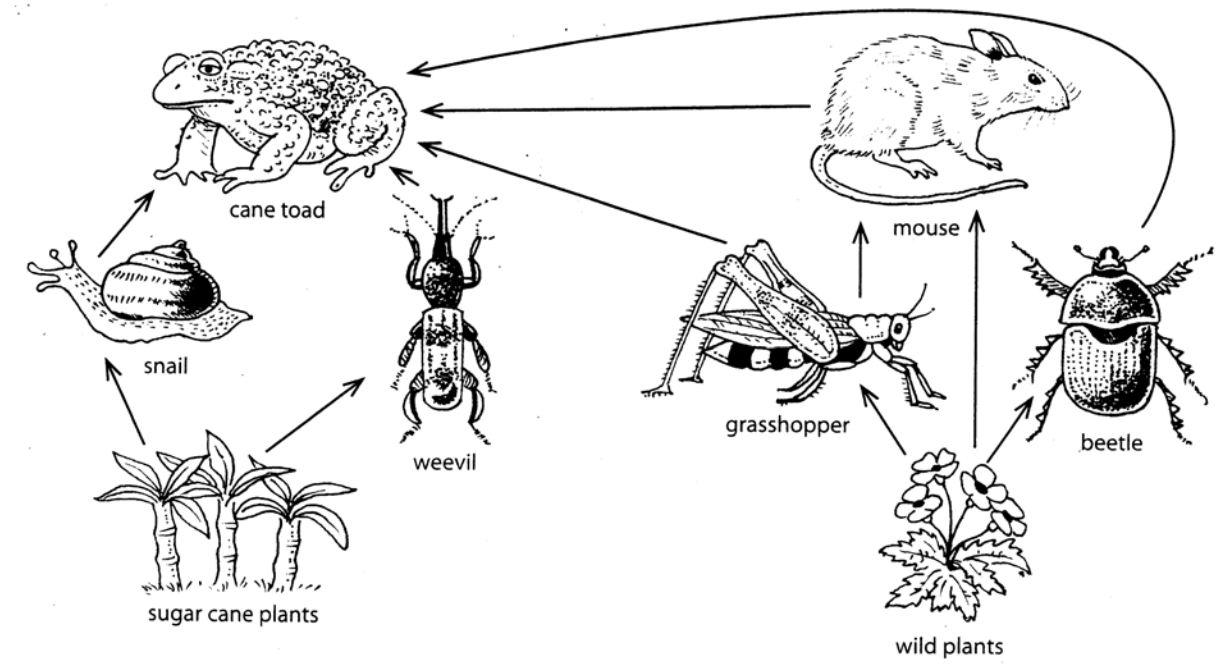
Section A
Answer all questions in this Section.

1. Farmers in Australia grow sugar cane plants as a crop. The following diagram shows a f web that farmers in Australia are using to decide whether to use the cane toad as a biological pest control method. The cane toad is not native to Australia.



a. List ONE reason why a farmer prefers a biological pest control method than the use of chemical pesticides.

_____ (1 mark)

b. From the food web name:
(i) ONE pest

_____

(ii) ONE secondary consumer

_____

(iii) the THREE organisms that belong to the same phylum.

_____

(1, 1, 1 mark)

c. Use the food web above to write a food chain that includes four trophic levels.

_____ (1 mark)

d. Explain how **each** of the following characteristics helps to increase the population of cane toads.
(i) The cane toads themselves are highly poisonous.

_____

(ii) The tadpoles of cane toads develop faster than those of native toad species.

_____

(1, 1 mark)
Total 7 marks

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2. The following diagram shows two batches (A and B) of lettuce planted at the same time in an experiment to investigate the effect of carbon dioxide on plant growth.

A

B

a. Which batch was supplied with extra carbon dioxide? Give a reason for your answer.

_____

_____

_____ (3 marks)

b. Light intensity was kept constant throughout the investigation.

(i) List TWO other environmental conditions that need to be kept constant during the investigation.

_____

_____

(ii) If you are asked to manage a greenhouse what change would you carry out to the light intensity in the greenhouse?

_____

(2, 1 mark)

c. The warm, humid conditions and abundant food in a greenhouse provide an excellent stable environment for pest development. A pest reduces the yield of crop plants. List TWO ways in which a pest can reduce the yield of crop plants.

_____

_____ (2 marks)

Total 8 marks

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3. The liver receives all the molecules that the gut absorbs from food. As well as useful molecules such as glucose and amino acids, this may include harmful molecules such as toxins or poisons. Alcohol is a drug that passes quickly to the liver after being absorbed from the stomach and ileum.

a. Name the TWO blood vessels that carry blood to the liver.

_____

_____ (2 marks)

b. From the passage above name the organ with an acidic pH.

_____ (1 mark)

c. The liver is considered as a storage organ. Explain.

_____

_____ (2 marks)

d. Alcohol causes small blood vessels in the skin to dilate. What is the visible effect of this?

_____ (1 mark)

e. Wilson's disease is an autosomal recessive genetic disorder in which copper accumulates in tissue. The Wilson's disease gene (ATP7B) has been mapped to chromosome 13 and is expressed primarily in the liver. Use genetic diagrams to explain why two unaffected parents were surprised to know that their first-born child was suffering from Wilson's disease.
(Use the letter **D** to represent Normal and the letter **d** to represent Wilson's Disease)

(3 marks)
Total 9 marks

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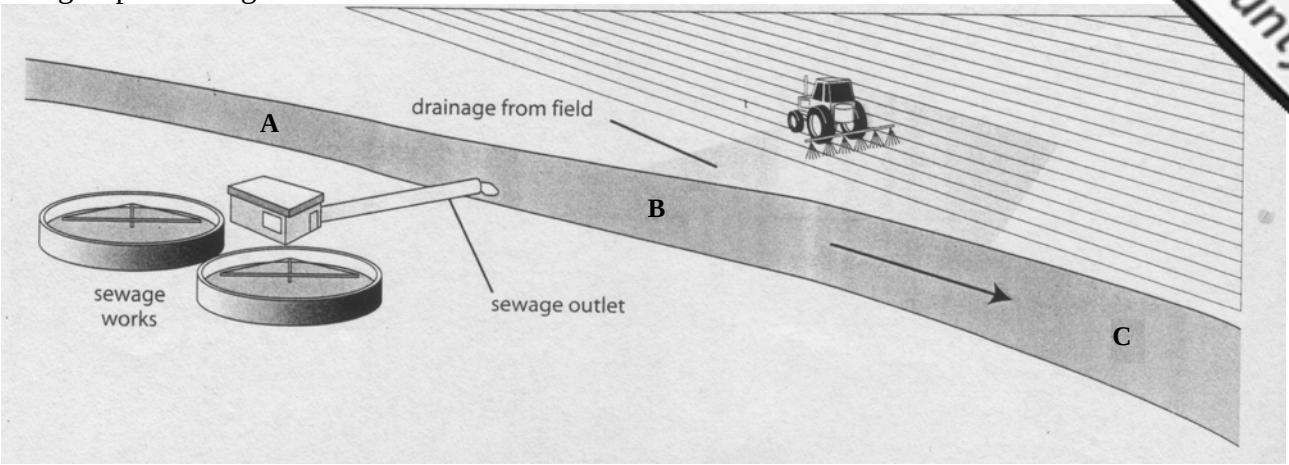
4. The following diagram shows parts of a river (A, B and C) that are being inves group of biologists.



a. At which point along the river would you expect the biologists to find the lowest concentration of dissolved oxygen in the water? Give a reason for your answer.

_____

_____ (2 marks)

b. The farmer of the field next to the river prefers using biodegradable pesticides instead of persistent pesticides. List ONE advantage of this.

_____ (1 mark)

c. At which point along the river would the biologists find the largest population of fish? Give a reason for your answer.

_____

_____ (2 marks)

d. The sludge worm and the bloodworm are found in polluted waters. Name the phylum to which both worms belong.

sludgeworm 

 bloodworm

_____

_____ (1 mark)

e. The farmer is planning to build a big farmhouse on the site of the field. List TWO negative effects of this project.

_____

_____ (2 marks)

Total 8 marks

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5. A biology student used some seeds for an investigation about the effect of light on g
seeds.
The following diagram shows the containers with seeds that the student has set up.

a. From the diagram above list:
(i) TWO factors that make this a fair investigation

_____

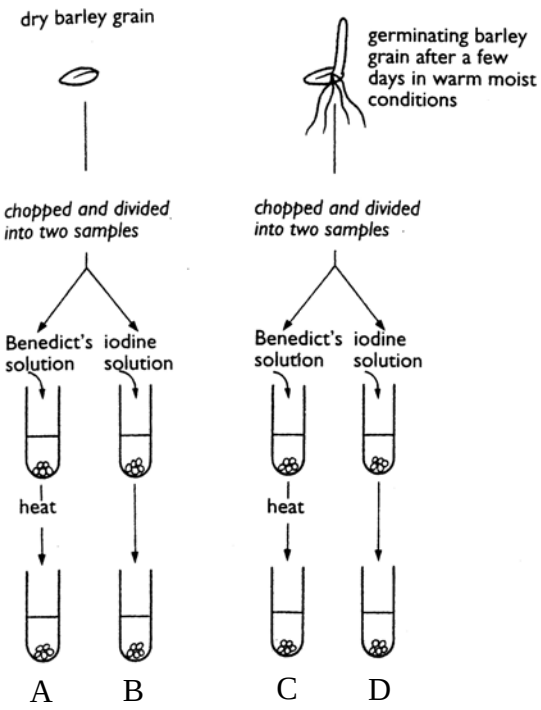
_____

(ii) ONE factor that needs to be changed to make the investigation more valid.

_____

(2, 1 mark)

b. The student carried out further investigations about the effect of germination on barley grains.
The following diagram shows the experimental set-up.



Explain why there was no change in test-tube A while an orange precipitate was formed in test-tube C.

_____

_____ (2 marks)

Total 5 marks

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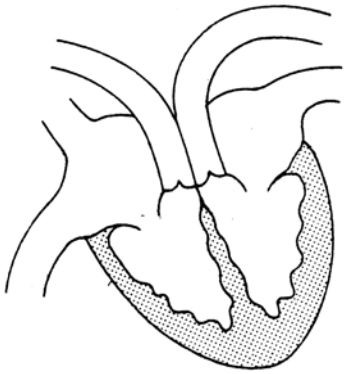
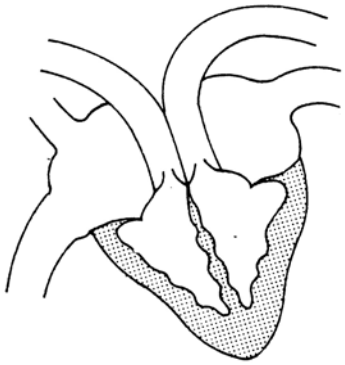
6. The following diagrams (A and B) show two different stages in the cardiac cycle.

A





B

a. List TWO differences between the two diagrams A and B.

_____

_____

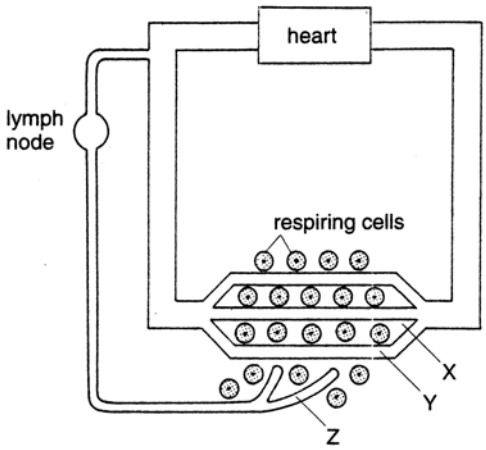
_____

_____ (4 marks)

b. On average the length of one cardiac cycle is 0.8 seconds. How many beats in 1 minute?

_____ (1 mark)

c. The following diagram shows a simplified version of the human circulatory system.



Which letter in the diagram indicates:

(i) blood plasma _____

(ii) lymph _____

(iii) tissue fluid? _____ (1, 1, 1 mark)

d. State ONE difference between blood plasma and tissue fluid.

_____ (1 mark)

Total 9 marks

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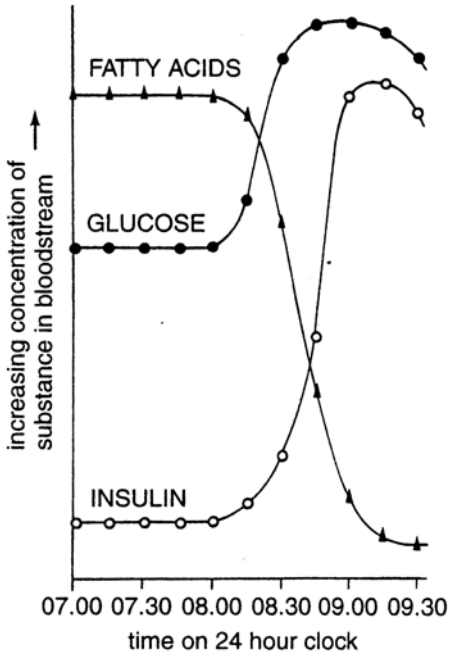
7. The following diagram shows the effect of consuming 50g of glucose (after a period
on the concentration of fatty acids, glucose and insulin in bloodstream.



a. During 07:00 and 08:00 the concentration of glucose in blood is at a steady level. Name the process that maintains blood sugar concentration at a steady level.

_____ (1 mark)

b. The glucose was taken up at 08:00. What initial effect did the intake of glucose have on:

(i) the blood sugar level?

_____

(ii) the concentration of insulin in the blood?

_____

(1, 1 mark)

c. Why was there a short time lag between the two effects mentioned in 'b'?

_____

_____ (2 marks)

d. Fatty acids are the breakdown products of fat. What is the effect of increasing the concentration of insulin on the breakdown of fats?

_____ (1 mark)

e. Give ONE reason why there is an ever-increasing need for insulin produced by genetic engineering.

_____ (1 mark)

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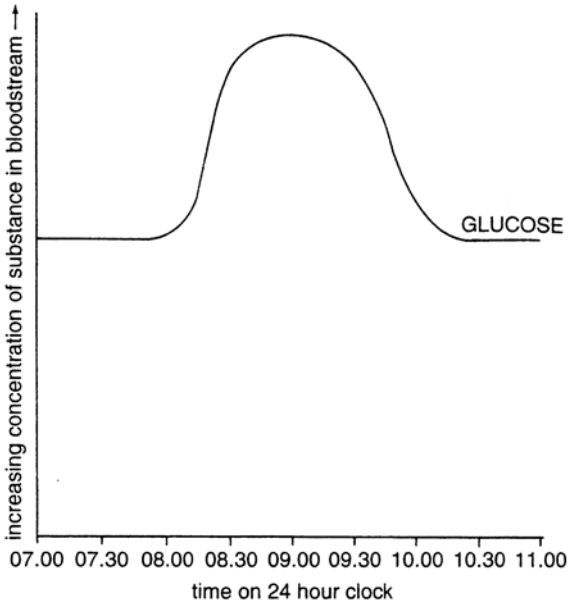
f. The following graph shows the glucose tolerance curve when the time was extended hours.



State TWO ways in which the glucose tolerance curve for a sufferer of diabetes would differ from the one shown above.

_____

_____ (2 marks)

Total 9 marks

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Section B

Answer question 1 from this section and choose TWO other questions. Answer the ques of Section B on a foolscap.

1. Read the following passage and then answer the questions that follow.

Rob Mills was a first class sprinter noted for his fine muscular physique and athletic qualities. During routine drug testing at the national championships however his blood was found to contain traces of Anapolon 50, an anabolic steroid, and he was disqualified. The drug Anapolon 50 is normally used by doctors to treat various forms of anaemia. The drug also promotes protein synthesis and it could enable the athlete to develop more muscle making him a stronger competitor.

a. (i) Muscle is a tissue. From the description above name the other tissue.
(ii) The muscle cell is a specialised cell. The root hair is another specialised cell. Draw the root-hair cell. (1, 2 marks)

b. (i) Suggest ONE way in which Mr. Mills could have stimulated the formation of red blood cells, without using the Anapolon 50 drug.
(ii) Explain the benefit of an increased red blood cell formation in an athlete. (1, 1 mark)

c. Compare the:
(i) resting pulse rate
(ii) recovery time
of an athlete with that of a non-athlete. (1, 1 mark)

d. Name the mineral that is important to prevent anaemia and explain its importance in red blood cells. (2 marks)

e. Explain why:
(i) anaemic persons experience tiredness, lethargy and dizziness
(ii) anaemia is much more common in women. (1, 1 mark)

f. Anabolic steroids are a class of steroid hormones related to testosterone.
(i) Where are hormones produced and how are they transported to target tissues or organs?
(ii) During exercise the hormone adrenaline is produced. The release of adrenaline stimulates the heart to beat faster and more deeply. What are the benefits of this? (2, 2 marks)

Total 15 marks

2. Jellyfish and other gelatinous organisms are among the top predators in estuaries and oceans. These predators eat mostly zooplankton and microscopic swimming crustaceans, but they also eat the eggs and larvae of many fish species, as well as other jellyfish. As a result jellyfish can be detrimental to fish populations by eating the same zooplankton prey, as well as eating the young fish directly.

a. Name the phylum to which the following belong:
(i) jellyfish
(ii) crustaceans (1, 1 mark)

b. Define the terms:
(i) population
(ii) larva. (1, 1 mark)

c. Explain how over-fishing can lead to an increase in jellyfish population. (2 marks)

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d. Several studies in sub-Arctic waters show correlations of greater jellyfish abunda warmer temperatures. Therefore jellyfish populations may increase with global warming ONE cause and ONE effect of global warming. (2 ma

e. Transoceanic shipping has accidentally transported several jellyfish species to new locations around the world. List TWO reasons why jellyfish have survived in these new habitats. (2 marks)

f. (i) Sea turtles such as leatherback turtles are predators of jellyfish. Leatherback turtles are considered to be endangered species. Give ONE reason why the leatherback turtles are in danger of extinction.

(ii) The leatherback turtle has flattened forelimbs. Explain the importance of this.

(iii) Like other reptiles, turtles are ectothermic. Explain the term ectothermic. (1, 1, 1 mark)

g. Most reptiles are land-living vertebrates. Which structural characteristic makes reptiles well adapted to survive on land? Give a reason for your answer. (2 marks)

Total 15 marks

3. Discuss:

a. the role of natural birth control methods in preventing pregnancy

b. the role of diet to prevent constipation

c. the role of bacteria in recycling nitrogen

d. the role of recycling as a way of conserving resources

e. the role of blood in body defence. (3, 2, 3, 4, 3 marks)

Total 15 marks

4. A UK-led team located two genes on chromosomes six and nine that appear to influence strongly the age at which menstruation starts. One of the two genes also plays a key role in the timing of puberty in both girls and boys. Reproductive lifespan is closely linked to the risk of developing conditions such as heart disease, breast cancer and osteoporosis. It is thought that the female sex-hormone oestrogen which is produced at higher rates during a woman's reproductive life, raises the risk of these diseases. Therefore the earlier a woman goes through puberty the higher the risk she may be at.

a. Distinguish between the terms gene and chromosome. (2 marks)

b. List TWO physical changes taking place at puberty in boys. (2 marks)

c. Explain what happens during menstruation. (2 marks)

d. Compare:
(i) the level of the hormone oestrogen during ovulation with that during menstruation
(ii) the level of the hormone progesterone in a pregnant female with that in a female who is not pregnant and has reached premenstrual phase. (2, 2 marks)

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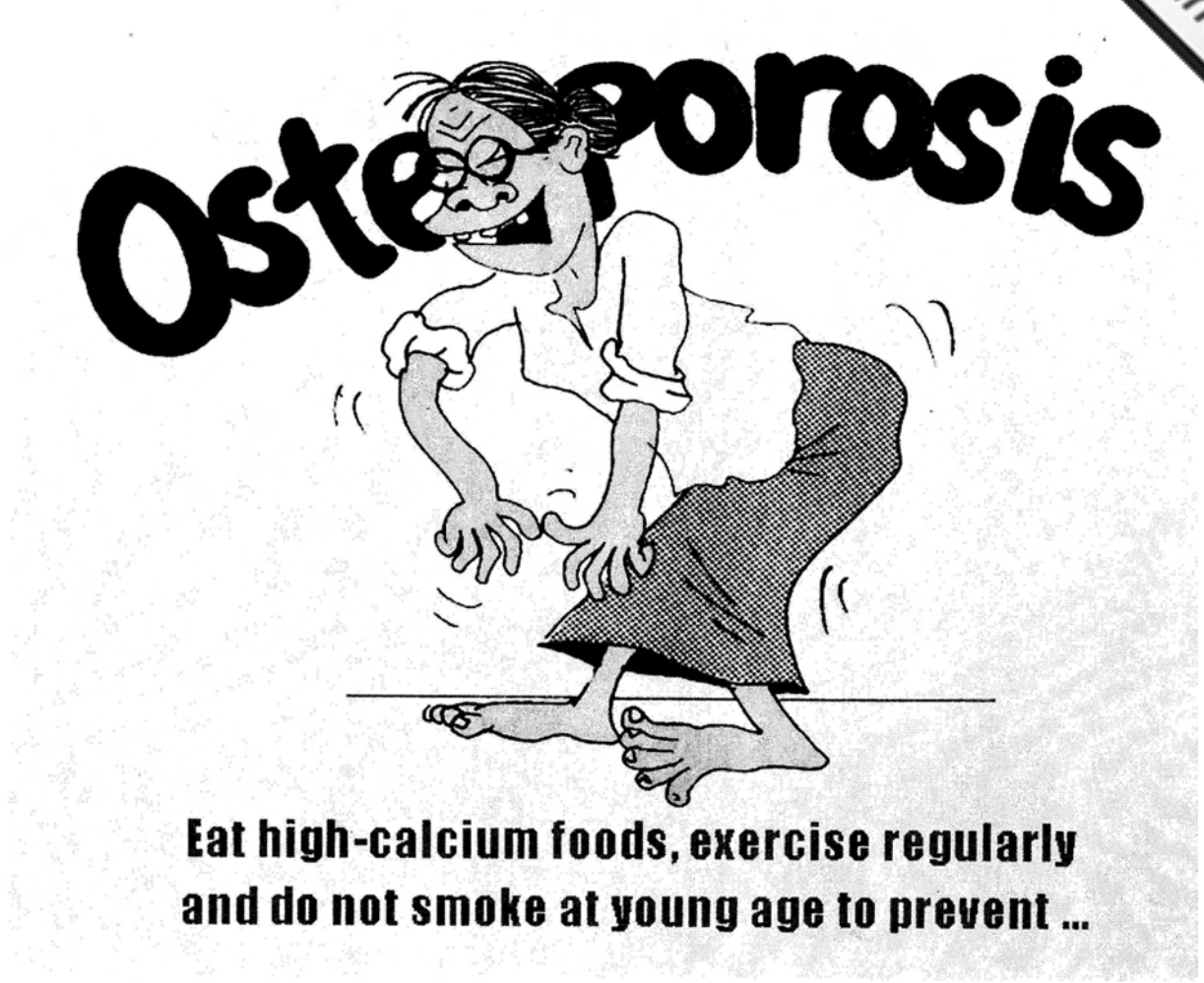
e. The following poster was designed for National Osteoporosis Day. Osteoporosis is [illegible] of bone that leads to an increased risk of fracture.



(i) Explain the importance of calcium in young children. (2 marks)
(ii) List ONE other disease (besides osteoporosis) linked to smoking. (1 mark)
(iii) Regular exercise can help protect you from osteoporosis. List TWO other health benefits of regular exercise. (2 marks)

Total 15 marks

5. Give a biological explanation for **each** of the following statements:

a. Deforestation can have a serious effect on the water cycle.

b. Positive phototropism of shoots is advantageous to plants.

c. Monocultures are not the best farming practices.

d. A network of small veins is found throughout the leaf.

e. The chloroplasts within the mesophyll cells can move. (2, 2, 5, 4, 2 marks)

Total 15 marks

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